Amendments to the Claims

1. (Currently amended) A swirler vane pack comprising:

an annular passageway having passageway extending radially inward from an inlet and curving aft to an axial outlet;

an array of vanes in the passageway at the inlet; and

means holding the vanes,

wherein each of the vanes has:

first and second ends with a span therebetween; and

a spanwise changing section comprising a spanwise changing chord.

2. (Original) The vane pack of claim 1 wherein:

a spacing between adjacent ones of said vanes is essentially spanwise constant.

3. (Canceled)

4. (Original) The vane pack of claim 1 wherein:

the second end has a chord that is 25-75% of a chord of the first end.

5. (Original) The vane pack of claim 1 wherein:

the spanwise changing section comprises a spanwise monotonically changing chord.

6. (Original) The vane pack of claim 1 wherein:

the vanes are unitarily formed with the means;

the vane first ends are proximal of the means and the vane second ends are distal of the means; and

the spanwise changing section comprises a chord spanwise monotonically distally decreasing.

7. (Original) The vane pack of claim 1 wherein:

the spanwise changing section is essentially symmetric across a chord.

8. (Original) The vane pack of claim 1 wherein:

the spanwise changing section is characterized by first and second flat facets along a major portion of a chordwise length of the vanes.

9. (Original) The vane pack of claim 1 wherein:

each of the vanes is untwisted.

10. (Currently amended) A method for engineering ~~the vane pack of claim 1~~ a swirler vane pack, the swirler vane pack comprising:

an annular passageway having passageway extending radially inward from an inlet and curving aft to an axial outlet; and

an array of vanes in the passageway at the inlet; each of the vanes having first and second ends with a span therebetween;

the method comprising:

determining a target change in swirl angle across ~~a~~ the ~~passageway associated with the vane pack~~; and

determining a distribution of ~~the~~ spanwise change in section effective to achieve the target change in swirl angle at a target operating condition.

11. (Original) The method of claim 10 further comprising:

measuring lean blow out characteristics of a swirler incorporating the vane pack.

12. (Original) A swirler assembly comprising:

a fuel injector;

a bearing coaxial with the fuel injector and having an outer surface forming a first surface of a first passageway from an inlet to an axial outlet;

a prefilmer coaxial with the fuel injector and having an inner surface forming a second surface of the first passageway and an outer surface forming first surface of a second passageway

from an inlet to an axial outlet;

a first array of vanes in the first passageway, each vane extending from a first end proximate the first passageway first surface to a second end proximate the first passageway second surface and having a section characterized by a spanwise decrease in chord of at least 25% from said first end to said second end; and

a second array of vanes in the second passageway.

13. (Original) The swirler assembly of claim 12 wherein the spanwise decrease in chord is effective to provide, at a target operating condition, a discharge profile characterized by swirl angle of:

a peak value located between 0% and 25% of an exit radius; and

a swirl angle of between 15° and 25° at a location between 95% and 100% of the exit radius.

14. (Original) The swirler assembly of claim 12 wherein the spanwise decrease in chord is effective to provide, at a target operating condition, a discharge profile characterized by swirl angle of:

a peak value located between 15% and 25% of an exit radius; and

a swirl angle of between 18° and 21° at a location between 95% and 100% of the exit radius.

15. (Original) The swirler assembly of claim 14 wherein the peak value is in excess of 85°.

16. (Original) The swirler assembly of claim 12 wherein the first passageway inlet and the second passageway inlet are circumferential inlets.

17. (Original) A high shear designed fuel injector for a combustor of a gas turbine engine comprising a fuel nozzle supported at an inlet of said combustor, a first radial inlet swirler mounted on said fuel nozzle and including a first passage for flowing air into the combustor and being coaxially disposed relative to said fuel nozzle, a second radial inlet swirler mounted

adjacent to said first radial swirler and including a second passage for flowing additional air into the combustor and being concentrically disposed relative to said first passage, said first radial inlet swirler having circumferentially disposed vanes, each of said vanes having a span between first and second ends and having a spanwise change in section effective to change the swirl angle from the first end to the second end to offset the swirl to a higher level that the swirl would be without the change in section to produce a Rankine vortex.

18. (Original) The high shear designed fuel injector of claim 17 wherein:
a majority of the air in the first passage and second passage is in the first passage.

19. (Original) The high shear designed fuel injector of claim 17 wherein:
the amount of air in the first passage is substantially equal to 50%-95% of the total air flow in the first passage and second passage.

20. (Original) The high shear designed fuel injector of claim 17 wherein:
a bulk swirl angle of air at a discharge of said second passage is substantially between 60°-75°.

21. (New) The method of claim 10 wherein the determining of the distribution comprises